STATE COOPERATIVE AGENCY DECISION STATEMENT
Kansas Department of Health and Environment
Bureau of Environmental Remediation

SITE NAME: **Farmers Elevator Company Site, C5-053-72293**

CITY/COUNTY: **Lincoln County**

DATE: **May 14, 2013**

MEDIA IMPACTED: **Soil and Groundwater**

LAND USE (Current): **Agricultural**

Site Background: The Former Farmers Elevator Company Site (Site) is located at 129 South Main Street, Sylvan Grove, Kansas. The legal description of the Site is the Southwest Quarter of the Northwest Quarter of Section 13, Township 12 South, Range 10 West and the Southeast Quarter of the Northeast Quarter of Section 14, Township 12 South, Range 10 West, Lincoln County, Kansas. The property was purchased by the Ringler brothers in 2004. On October 5, 2011 property owners Gregory J. Ringler and Glenn P. Ringler entered into a cooperative agreement with KDHE for investigation at the site. On September 21, 2012, a Remedial Action Agreement was executed between the parties for remedial activities. Both agreements provided for work to be conducted by Kansas State University (KSU) students as course study. The investigation and remedial efforts completed by the students have been under the guidance of volunteer environmental consultants and their professors and overseen by KDHE.

Research of the Site location identified grain elevators were present at the Site in historical photographs dating back to 1901. In 1997 the Farmers Elevator Company used the Site for dry fertilizer and grain storage and for sales of farm and chemical supplies. Multiple property owners possessed the property from 1992 to 2004, when the Ringler Brothers purchased two parcels of the three parcel property.

A Phase I Environmental Site Assessment (ESA) was conducted in May of 1996 on behalf of Barnard Grain by Enviro Tech Services, Inc. Historical operations on the property included grain milling, coal storage, retail lumber store, and rail depot. Previously a fumigant known as 80/20 was used at the facility, prior to 1985. This fumigant was a mixture of 80% carbon tetrachloride and 20% carbon disulfide. Current facility personnel reported that 80/20 was purchased in one and five gallon containers. No bulk storage of carbon tetrachloride is known to have occurred. The Phase I ESA concluded that the Farmer Elevator Company did not store bulk chemicals or liquid fertilizer are stored at the facility. Phostoxin was the current fumigant used at the facility, which has minimal potential for causing soil or groundwater contamination. No direct evidence was identified during this Phase I Assessment to indicate that the soil or groundwater underlying the property had been negatively impacted as a result of activities conducted on the subject property.

A Site Reconnaissance and Evaluation (SRE) was conducted in May 2008 as part of the continuing cooperative agreement with the U.S. Environmental Protection Agency (EPA) to perform investigations of selected sites to evaluate potential or actual releases of hazardous substances, pollutants, or contaminants in Kansas. Twelve soil samples and

four groundwater samples were collected and analyzed for nitrate, ammonia, and atrazine during the SRE investigation. Laboratory results indicated that the maximum concentration of nitrate in soil was 5,700 milligrams per kilogram (mg/kg) at one to two feet below ground surface (bgs), exceeding the nitrate guideline in soil of 85 mg/kg. Nitrate was detected in groundwater at 35 milligrams per liter (mg/L), exceeding the maximum contaminant level (MCL) of 10 mg/L. Atrazine was detected in groundwater at 7 micrograms per liter (ug/L) exceeding the residential Risk-Based Standard of Kansas (RSK) value of 3 ug/L. Volatile Organic Compounds (VOCs) were not identified in soil or groundwater. Based on the results, KDHE deemed that Additional investigation and delineation were necessary.

KSU students conducted an investigation in November 2011. A total of 36 soil samples were collected and analyzed for nitrate and ammonia. Four monitoring wells were installed on site (ranging in depth from 30 to 35 feet bgs) and sampled for ammonia, nitrate, and atrazine. After surveying the wells groundwater flow is assumed to be to the southwest. Soil samples indicated that the highest concentrations of nitrate and ammonia were located a visibly scarred area at the site. The scarred area can be seen on aerial imagery (see FIGURE 3). Nitrate was detected in all four wells; three of the wells (MW-1, MW-3, and MW-4) contained nitrate concentrations above the MCL ranging from 19.5 to 45.75 mg/L. MW-1 located up-gradient from the known source area (scarred area) indicated a concentration of 45.75 mg/L of nitrate. MW-1 appears to be impacted from an offsite source, which will be further investigated by KDHE through the Site Assessment Program. Atrazine was not detected in any of the four monitoring wells. Kansas State University students submitted a Comprehensive Investigation/Corrective Action Study (CI/CAS) Report to KDHE dated April 4, 2013, which was approved by KDHE on April 29, 2013. The CI/CAS report include the proposal of a remedial plan.

Remedial Plan: Surface and subsurface soils within the scarred area on site are impacted with nitrate and ammonia at concentrations exceeding the KDHE nitrate guidelines. Groundwater at the Site is impacted with nitrate above the MCL. Since the Site is located in a rural area and no private drinking wells or residential properties are impacted, the proposed remedial plan to address residual soil and groundwater at this property will include excavation within the scarred area approximately one foot in depth, backfilling the excavation with clean soil and planting of native grasses to promote phytoremediation of the residual nitrate in the soil (plants uptake nitrogen for growth). Cottonwood trees will be planted on the southern property boundary as a hydraulic control mechanism to prevent impacted groundwater from leaving the Site. Long-term groundwater monitoring of existing wells will continue until all the wells are below the MCL for nitrate for four consecutive, equally time-sequenced sampling episodes conducted under KDHE oversight over a period of no less than two years. An Environmental Use Control (EUC) will also be placed on the property to address the residual impacted soils at depth.

Specific requirements of the remedial plan include the following:

(1) Long-term groundwater monitoring for nitrate and ammonia and measurement of static water levels will be conducted on a semiannual basis. Groundwater monitoring results will be reviewed on a routine basis to evaluate the effectiveness of the

phytoremediation in addressing nitrate/ammonia concentration and if additional monitoring wells and/or other modifications to the monitoring program are necessary to satisfy project objectives.

(2) KDHE will review new information as it becomes available to evaluate whether the proposed remedial plan is protective of human health and the environment. If new information suggests that contamination at or emanating from the Site poses a threat to human health and the environment, KDHE may require development and implementation of contingency measures. These measures may include additional characterization, evaluation of remedial alternatives, and/or implementation of active remedial measures.

Recommendation: On the basis of information available in the Administrative Record and summarized above, KDHE recommends implementation of the proposed remedial plan.

Community Involvement: A Public Information Strategy for the Site was developed by KDHE. Public notice of the availability of the Draft Agency Decision Statement will be published in the *Lucas Sylvan News* on July 22nd and a 30-day public comment period will be open from July 22, 2013 until August 22, 2013.

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Table 1: Summary Soil Sample Data- KSU Lab Data
NH_4-N=Ammonium as Nitrogen, NO_3-N=Nitrate, NO_3-N+NH_4-N=Total Nitrate and Ammonia
Soil samples collected on November 10, 2011 and November 18, 2011.

Sample ID	Probe Site	Depth(inches)	NH_4-N (mg kg^{-1})	NO_3-N (mg kg^{-1})	NO_3-N + NH_4-N (mg kg^{-1})†
1-N1-K	Site 1	0-8	43.1	43.4	*86.5*
1-N2-K	(SP-1)	12-24	6.5	7.9	14.5
1-N3-K		48-60	4.9	151.8	***156.7***
1-N4-K		96-108	6.3	137.5	***143.8***
1-N5-K		144-150	5.5	43.0	***48.5***
2-N1-K	Site 2	0-8	14.5	11.0	25.5
2-N2-K	(SP-2)	12-24	5.9	20.9	26.7
2-N3-K		48-60	4.1	55.6	***59.6***
2-N4-K		96-108	2.4	15.2	17.6
2-N5-K		120-156	2.8	33.9	36.7
3-N1-K	Site 3	0-8	8.1	7.2	15.4
3-N2-K	(SP-3)	12-24	2.6	2.8	5.5
3-N3-K		48-60	2.5	9.0	11.5
3-N4-K		104-114	2.2	1.8	4.0
4-N1-K	Site 4	0-8	18.4	25.8	44.1
4-N2-K	(SP-4)	12-24	5.0	524.4	***529.4***
4-N3-K		72-81	2.6	78.3	***80.9***
4-N4-K		96-108	1.8	36.6	38.3
4-N5-K		132-144	1.9	16.4	18.4
5-N1-K	Site 5	0-8	6.8	45.1	51.9
5-N2-K	(SP-5)	12-24	3.5	354.0	***357.4***
5-N3-K		48-60	3.3	145.6	***148.9***
5-N4-K		96-108	1.8	49.1	***51.0***
5-N5-K		132-144	2.0	83.0	***85.0***
6-N1-K	Site 6	0-8	713.2	3991.9	***4705.1***
6-N2-K	(SP-6)	12-24	149.6	1233.4	***1382.9***
6-N3-K		48-60	3.4	506.0	***509.4***
6-N4-K		84-96	4.4	137.6	***142.0***
7-N1-K	Site 7	0-8	6.2	2.9	9.1
7-N2-K	(SP-7)	12-24	6.0	2.5	8.4
7-N3-K		48-60	3.9	34.1	38.0
7-N4-K		96-108	8.0	14.5	22.5
8-N1-K	Site 8	0-8	9.3	13.1	22.4
8-N2-K	(SP-8)	12-24	2.0	2.9	5.0
8-N3-K		48-60	3.1	1.7	4.7
8-N4-K		96-108	2.2	1.3	3.5

† Values exceeding the RSK standards for NO_3-N + NH_4-N in unvegetated soil are italicized (>85 mg kg^{-1} at 0-8 inches and >40 mg kg^{-1} at depths greater than 8 inches) and values exceeding RSK standards for NO_3-N + NH_4-N in vegetated soil are in bold type (>200 mg kg^{-1} at 0-24 inches and >40 mg kg^{-1} at depths greater than 24 inches).

Table 2: Summary Soil Sample Data-CAS Lab Data

NH_4-N=Ammonium as Nitrogen, NO_3-N=Nitrate, NO_3-N+NH_4-N=Total Nitrate and Ammonia
Soil samples collected on November 10, 2011 and November 18, 2011.

Sample ID	Probe Site	Depth(inches)	NH_4-N (mg kg^{-1})	NO_3-N (mg kg^{-1})	NO_3-N + NH_4-N (mg kg^{-1})†
6-N1-C	Site 6	0-8	900	3900	***4800***
6-N2-C	(SP-6)	12-24	195	1180	***1375***
6-N3-C		48-60	12	430	***442***
6-N4-C		84-96	11	136	***147***

† Values exceeding the RSK standards for NO_3-N + NH_4-N in unvegetated soil are italicized (>85 mg kg^{-1} at 0-8 inches and >40 mg kg^{-1} at depths greater than 8 inches) and values exceeding RSK standards for NO_3-N + NH_4-N in vegetated soil are in bold type (>200 mg kg^{-1} at 0-24 inches and >40 mg kg^{-1} at depths greater than 24 inches).

Table 3: Additional Soil Sampling Data

NH_4-N=Ammonium as Nitrogen, NO_3-N=Nitrate, NO_3-N+NH_4-N=Total Nitrate and Ammonia
Nitrate and ammonium analysis for soil samples collected on April 1, 2012.

Sample ID	Location ID	Replicate	Depth(inches)	NH_4-N (mg kg^{-1})	NO_3-N (mg kg^{-1})	NO_3-N + NH_4-N (mg kg^{-1})†
S9A-1	SP9	A	0-8"	7.3	5.8	13.1
S9A-2	SP9	A	12-24"	5.6	7.4	13.0
S9B-1	SP9	B	0-8"	4.9	5.0	9.9
S9B-2	SP9	B	12-24"	4.2	4.6	8.8
S9C-1	SP9	C	0-8"	5.2	2.7	8.0
S9C-2	SP9	C	12-24"	5.1	2.1	7.2
S10A-1	SP10	A	0-8"	6.8	2.6	9.4
S10A-2	SP10	A	12-24"	2.6	0.9	3.5
S10B-1	SP10	B	0-8"	5.1	1.9	7.0
S10B-2	SP10	B	12-24"	4.2	0.9	5.0
S10C-1	SP10	C	0-8"	7.8	1.1	8.8
S10C-2	SP10	C	12-24"	5.3	0.6	6.0
S11A-1‡	SP11	A	0-8"	7.3	5.0	12.3
S11B-1	SP11	B	0-8"	6.9	3.3	10.2
S11B-2	SP11	B	12-24"	5.7	1.4	7.1
S11C-1	SP11	C	0-8"	5.5	3.2	8.7
S11C-2	SP11	C	12-24"	5.0	0.9	5.9
S12A-1	SP12	A	0-8"	8.2	11.7	19.9
S12A-2	SP12	A	12-24"	7.1	48.3	*55.4*
S12B-1‡	SP12	B	0-8"	10.3	261.4	***271.7***
S13A-1	SP13	A	0-8"	7.2	5.6	12.7
S13A-2	SP13	A	12-24"	4.3	1.6	6.0
S13B-1	SP13	B	0-8"	6.4	8.6	15.0
S13B-2	SP13	B	12-24"	4.5	2.6	7.1

† Values exceeding the RSK standards for NO_3-N + NH_4-N in unvegetated soil are italicized (>85 mg kg^{-1} at 0-8 inches and >40 mg kg^{-1} at depths greater than 8 inches) and values exceeding RSK standards for NO_3-N + NH_4-N in vegetated soil are in bold type (>200 mg kg^{-1} at 0-24 inches and >40 mg kg^{-1} at depths greater than 24 inches).

‡ soil properties prohibited the collection of12-24 inch sample

Table 4: Summary Groundwater Data

Groundwater samples collected on November 10, 2011

NO_3-N Results (mg/L)					
Sample ID	KSU BAE Labs	Continental Lab (CAS)	Mean	Standard Deviation	RSK Values MCL
MW-1	**45.75**	45	45.38	0.53	10
MW-2	7.13	NA	NA	NA	10
MW-3	**19.4**	NA	NA	NA	10
MW-4	**45.05**	37	41.03	5.69	10

*__Bold__- Results indicate an exceedance of the MCL.

FIGURE 1: SITE LOCATION

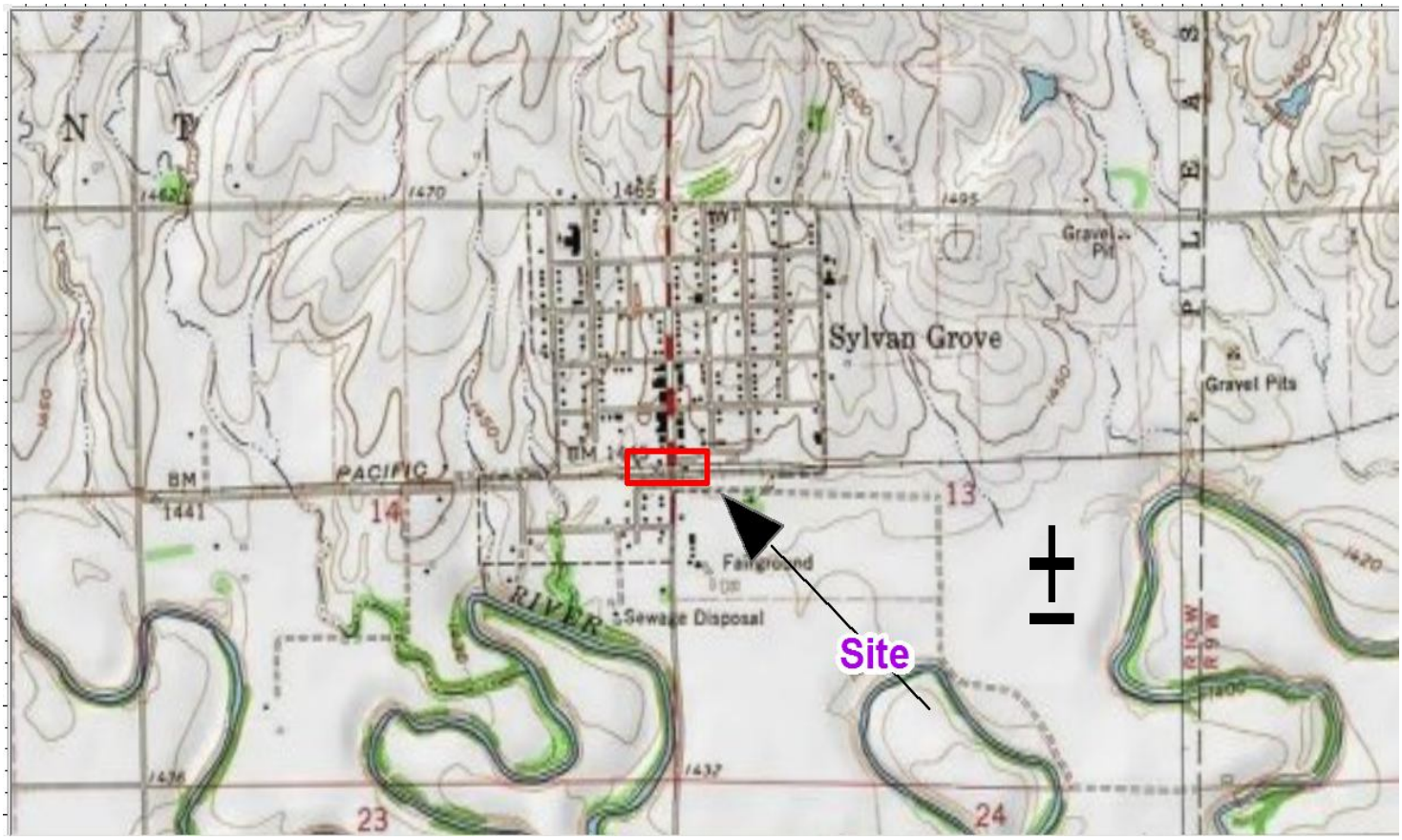

FIGURE 2:

Site Boundary

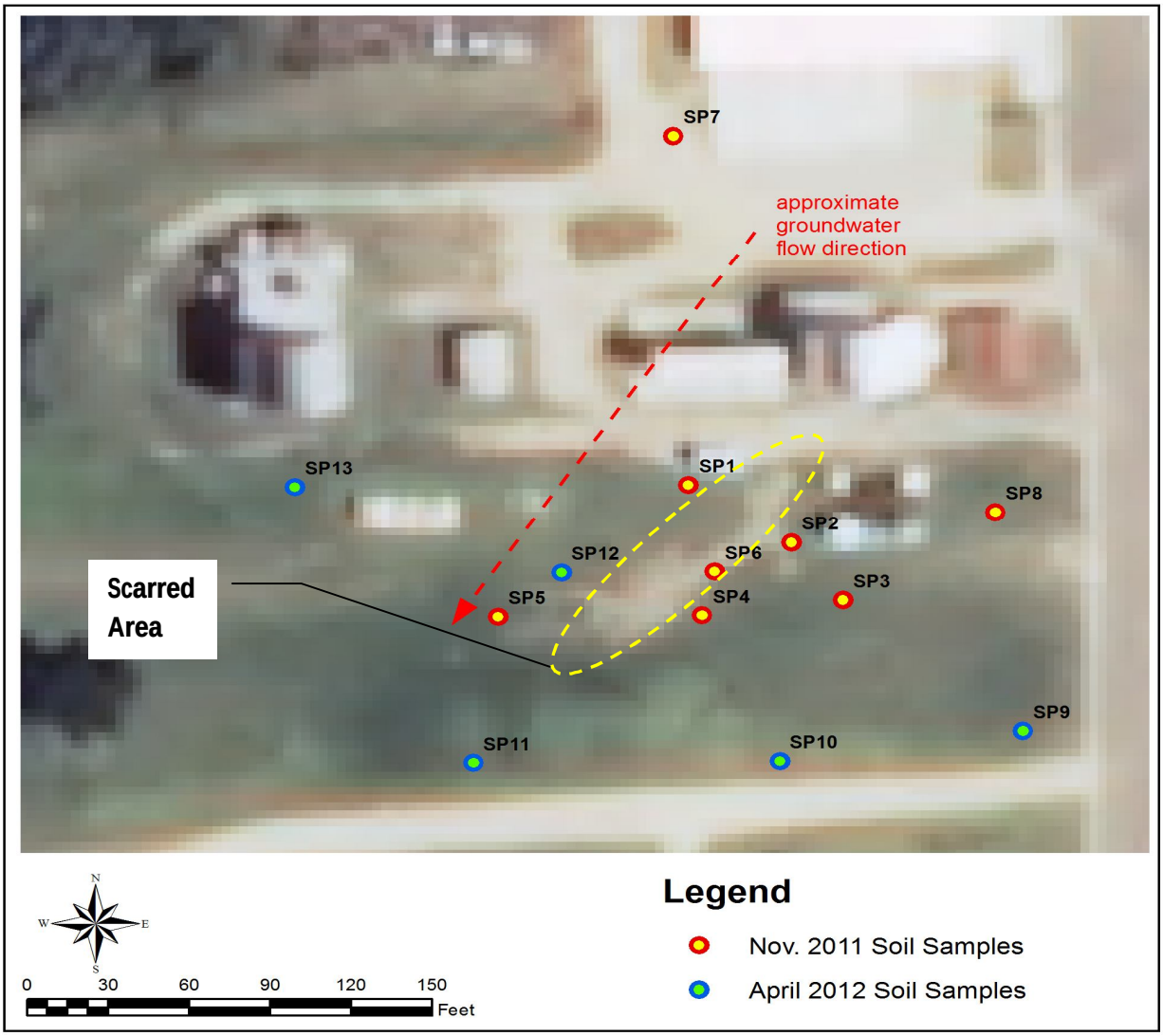

FIGURE 3: Soil Sample Locations

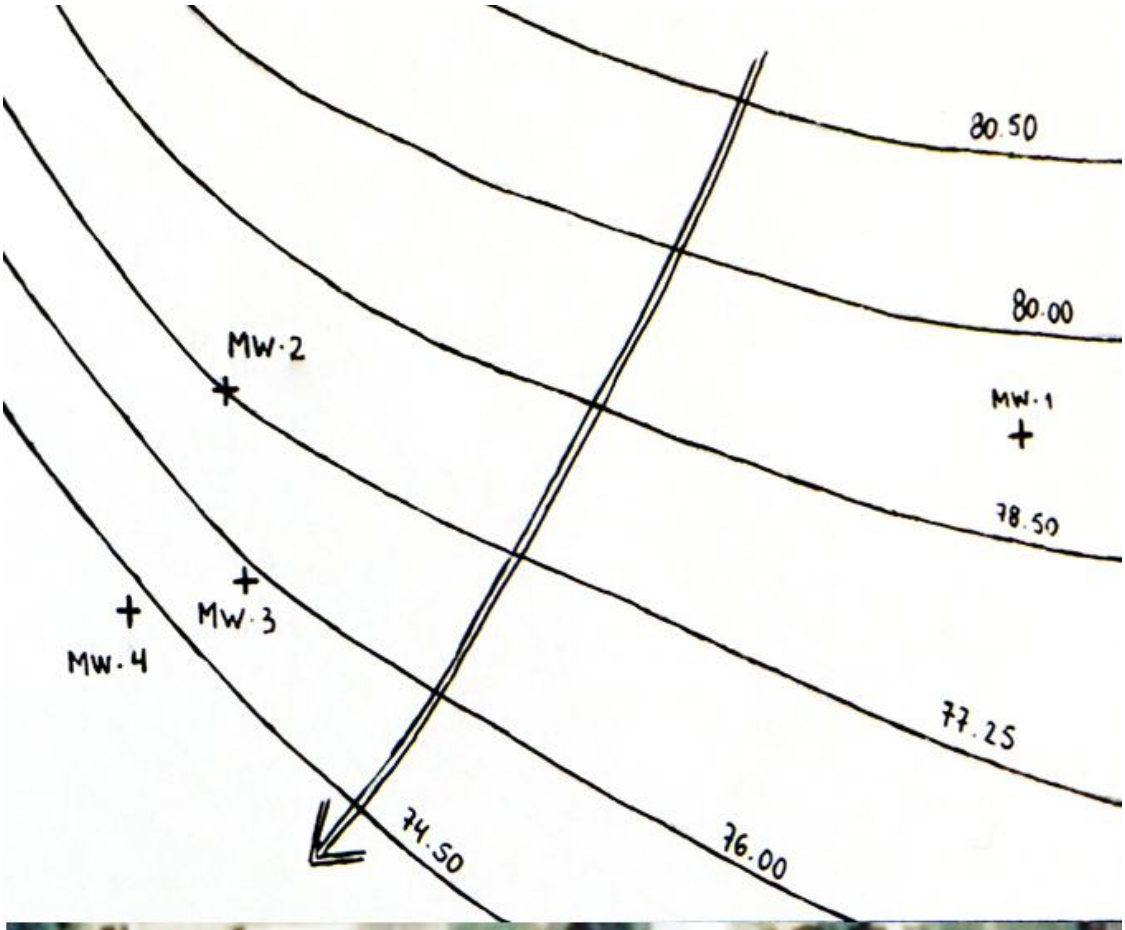

FIGURE 4: Groundwater Flow Direction and Monitoring Well Locations with Nitrate Concentrations.